

## REMARKS

The Reply addresses all outstanding matters of form and the prior claims rejections and places the application in condition for allowance. Applicant respectfully requests that the Examiner consider continued examination and enter this amendment.

### Claims 1,3,4, and 6-9

Claims 1, 3, 4, 6-9 were rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent JP 6116073 to Takenaka Komuten Co. in view of PCT WO 74478A1 to Fleischmann, U.S. Patent No.5,985,538 to Stachecki and New Scientist, "Feedback", Vol.141,no 1981,page 92,26 March 1994.

Applicant has amended the claims which are fully supported by the specification. These rejections are respectfully traversed.

Regarding Claims 1 and 8, Examiner pointed out in Detailed Action Page 2: " Takenaka teaches a method for closed-loop (Takenaka translation page 6 first line of paragraph[0018]) regeneration of food for humans during a long term mission in space (Takenaka translation page 1 line 6)."

Takenaka did mention in paragraph [18]: " In general, this invention can be used in closed environment both in universal space and on earth,..." But applicant did not find the content of "regeneration of food for humans during a long term mission in space" in Takenaka translation page 1. line 6.

As to the applicant's view, there is a most essential distinction between Applicant's and Takenaka's disclosure. The applicant's disclosure relates to a method of **using a closed-loop food regeneration system to sustain the food supply for human in long term space mission**. As described in the specification, **applicant's approach allows human food be regenerated by rearing maggots, animals and growth of plant crops. Most of bio-wastes from humans, animals and space plant crops may be recycled.**

In order to reveal the essential distinction between applicant's and Takenaka's disclosure more clearly, applicant attaches a fundamental draft (Figure 1 on page 6) of this application to compare with Takenaka's figure in his patent (as seen Fig.1 on page 7).

**In applicant's approach, there are four parts of humans, animals, maggots, and plant crops that form a closed-loop food regeneration system. Each part has a role in waste recycling and food regeneration, as seen in Figure 1 on page 6:**

**The maggots** recycle all the wastes from other three parts and supply them as animal's feedstuff and human's food; supply CO<sub>2</sub> and the residues after rearing the maggot as fertilizer for plant crops;

**The human** get the food from other three parts and O<sub>2</sub> from the plant crops, supply human wastes for rearing maggot and the CO<sub>2</sub>, gray water for plant crops;

**The animals** get the feedstuff from maggots and plant crops, get the O<sub>2</sub> from the plant crops too, and supply the food for human; provide

its wastes for rearing maggot, and supply the CO<sub>2</sub> for the plant crop;

The plant crops supply the food for human, supply the feedstuff for animals, supply the inedible matter for rearing maggot; get the fertilizer from rearing maggots, get the CO<sub>2</sub> from other three parts and supply the O<sub>2</sub> for other three parts;

This closed-loop food regeneration system enables human to realize self sufficient of the food supply while flying in long term space mission or living on permanent planetary bases independent of food from earth.

Takenaka's figure shows, rearing maggot by feeding human and animals wastes in a closed environment, such as in space; can produce three kind of materials: bio-humic material (humic soil), biomass of maggots and bio gas. The humic soil can be used as organic fertilizer; the larvae biomass can be used as animal feedstuff; the bio-gas can be used as fuel. It is obvious that Takenaka disclosed to produce three kinds of materials, he did not disclose raising maggot (fly larvae) for using in a food regeneration system by fully recycling the bio-wastes, nor for producing of human food. He also did not disclose how to recycle all these bio-wastes fully in a closed loop mode. In fact, his method of utilizing the animal and human wastes for producing three kinds of materials was said in a closed environment, but its producing mode is really an open-loop mode, as seen in Fig.1 on page 7. He did not mentioned how he can realize an open-loop mode's production in a closed environment. This is also a distinction with applicant's

closed-loop mode. Moreover, with Takenaka's approach, he mentioned rearing maggot only. He did not either mention to rear pupa or recycle plant crops with the maggot. Only human and animal wastes were used in his rearing process. He did not mention preparing a powder from the maggots, he only mentioned "The bio-humic material (humic soil) is odorless powder." See "Takenaka translation page 3 paragraph [008] first line." This bio-humic powder is not the maggot powder.

**Freezing fly eggs in liquid nitrogen can minimize the food source loading, storing and transporting during the long term mission in the space. It may need to take hundreds of years and several light-year space traveling. It is a key technology in this invention. By this way, usually it doesn't need to rear a large amount of flies in the space, because rearing flies in space would take much more room and labor than rearing its larvae only, it is almost impossible to rear flies in narrow spaceship. But in Takenaka's patent, he never mentioned freezing fly eggs in liquid nitrogen, this is because in his disclosure everything is not related to food regeneration and the storing of food source.**

Examiner pointed out that it is old and notoriously well-known to store and/or transport eggs by cooling the fly eggs such as Fleishmann done or by using liquid nitrogen to freeze eggs such as Stachecki done.

Fleishmann's invention provides a process and a device for rearing of fly larvae, to obtain the secretion of fly larvae more simply for therapeutic application. The process includes cooling the eggs and/or storing the eggs in a dehumidified atmosphere. Though Fleishmann

is silent on his cooling way, but it seems a normal cooling way, not a cryopreservation cooling by liquid nitrogen.

Stachecki's invention provides an improved culture and cryopreservation medium which allows an oocyte or other cell types to remain vital through a freeze/thaw cycle. This cryopreservation medium is used to freeze cells in liquid nitrogen.

**As to the applicant's view, the ordinal skill of using liquid nitrogen to freeze eggs is never mentioned to use in the long term space mission for food source storage in those references, it is not the negligence of the previous inventors, but is useless in their inventions, the same as Takenaka's too.**

Takenaka never mentioned feeding the maggot powder directly as the food for humans. As examiner pointed out : "the New Scientist article "Feedback" teaches that it is old and well-know for humans to eat food derived from maggots." But as to the applicant's view, these food derived from maggot will not be used as space food in long term space mission. **Takanaka will not take this ordinary skill too since his invention is independent of the food regeneration and food supply.**

As the discussion above makes clear that Claim 1 is not anticipated by Takenaka and other references. Claim 1 is therefore patentable over Takenaka and other references.

Regarding Claim 3, is the same reason as mentioned above, Takenaka never mentioned to use the maggots as a carrier by feeding the maggots with vitamins, minerals, electrolytes and antibiotics that

human need. So Claim 3 is not anticipated by Takenaka. Claim 3 is therefore pentable over Takenaka.

Regarding Claim 4, the applicant cancelled this Claim.

Regarding Claim 6, Takenaka did mention only one sentence in his specification about animal meat taste (Takenaka translation page 5 paragraph [0014]): "the taste of the animal meat are delicious, it is better than the usual animal meat by flavor tasting." But he never mentioned to use the poultry, aquatic animals, amphibians, livestock, and their eggs as nourishing food for the humans in space.

There is a closed-loop food chain in applicant's disclosure, as mentioned in applicant's specification , the maggots, animals and plant crops are the medium loops between the human food and the wastes. The closed-loop food chain of food-wastes-food can be completed by the three steps: The first step we must complete is to convert all wastes from human, animals and plant crops efficiently into maggots; The second step is, to take maggots combining with plants crops as animal feedstuff; The third step is, these animals and their eggs, the plant crops as well as the maggot powder are looked upon as human food. These three steps are the inseparable parts and they are tightly connected step by step for whole of the closed-loop food regeneration chain. The claim 6 includes of the two steps in this food chain.' Though Takenaka disclosed to rearing maggots by wastes, to feeding animals by maggot in space, but he didn't disclose the closed-loop food regeneration chain in space as applicant's. Claim 6 therefore

patentable over Takenaka's disclosure.

Regarding Claim 7 and 8, the applicant cancelled these claims.

Regarding Claim 9, Takenaka did not mention in his invention to use animals fed by maggot and the maggot powder as healthy food for human to assist in resisting radiation and improving immune abilities. So Claim 9 is not anticipated by Takenaka. Claim 9 is therefore patentable over Takenaka.

#### Conclusion

The changes to the claims overcome the objections in the office action. This remarks demonstrate that the applicant's claims 1, 3, 6, 9 are not anticipated by the disclosures of Takenaka, Fleischmann, Stachecki and New Scientist, "Feedback, so this application is in the condition for allowance. Reconsideration of the application and allowance are respectfully requested."

*Jan. 29, 2005*

Date

Respectfully submitted,

*Zhang Mao*

Mao Zhang  
5578 SPUR CT  
Fontana, CA 92336

Note : The list of the attachments:

- 1, One filled RCE form (PTO/SB/30);
- 2, One paycheck for paying the RCE fee : US \$395
- 3, One returned postcard.